CLAIMS

1. A rolling method of a flat-rolled metal material, for executing rolling by using a rolling mill having at least work rolls and backup rolls for a flat-rolled metal material, comprising the steps of:

measuring rolling direction force acting on roll chocks on a operator side and a driving side of said work rolls;

calculating the difference of said rolling direction force between the operator side and the driving side; and

controlling a left-right swivelling component of roll gap of said rolling mill on the basis of said difference.

2. A rolling method of a flat-rolled metal material according to claim 1, further comprising the steps of:

measuring camber of a rolled material; and

learning a control target value of the difference of said rolling direction force between the operator side and the driving side on the basis of said camber.

3. A rolling apparatus for a flat-rolled metal material including a rolling mill having at least work rolls and backup rolls, comprising:

load detection devices for measuring rolling direction force acting on work roll chocks, arranged on both entry side and exit side of said roll chocks in a rolling direction on both operator side and driving side of said work rolls.

4. A rolling apparatus for a flat-rolled metal material according to claim 3, further comprising:

a device for pressing said work roll chock in the rolling direction, arranged on either one of the entry side and the exit side of said work roll chock in the rolling direction.

5. A rolling apparatus for a flat-rolled metal

material according to claim 3, wherein said device for pressing said work roll chock in the rolling direction is a hydraulic powered device.

6. A rolling apparatus for a flat-rolled metal material according to claim 4 or 5, further comprising:

a device for pressing said work roll chock in the rolling direction, arranged on the side opposite to the side in which said work roll is offset with said backup roll being the reference, of the entry side and the exit side of said work roll chock in the rolling direction.

7. A rolling apparatus for a flat-rolled metal material according to any of claims 3 through 6, further comprising:

a calculation device for calculating a difference of rolling direction force acting on said work roll chock between the operator side and the driving side on the basis of a measurement value by said load detection device;

a calculation device for calculating a left-right swivelling component control quantity of roll gap of said rolling mill on the basis of the calculation value of the difference of said rolling direction force between the operator side and the driving side; and

a control device for controlling the roll gap of said rolling mill on the basis of the calculation value of the left-right swivelling component control value of the roll gap.

8. A rolling apparatus for a flat-rolled metal material according to any of claims 3 through 6, further comprising:

a camber measurement device for measuring camber of a rolled material.

9. A rolling apparatus for a flat-rolled metal material according to any of claims 3 through 6, further comprising:

a calculation device for calculating a

difference of rolling direction force acting on said work roll chock between the operator side and the driving side on the basis of a measurement value by said load detection device;

a calculation device for calculating a left-right swivelling component control quantity of roll gap of said rolling mill on the basis of the calculation value;

a control device for controlling the roll gap of said rolling mill on the basis of the calculation value of the left-right swivelling component control value of the roll gap;

a camber measurement device for measuring camber of the rolled material; and

a calculation device for learning a control target value of the difference of said rolling direction force between the operator side and the driving side on the basis of the camber measurement value by said camber measurement device.